Better Plants Online Learning Series

We'll be starting in just a few minutes….

Visit our **Online Learning Series** page on the Solution Center to see our full series lineup, RSVP, and access previously recorded webinars.

Online Learning Series – Webinar #11
MEASUR Tool Suite

Eli Levine

Office of Energy Efficiency and Renewable Energy

Eli Levine

U.S. Department of Energy

U.S. DEPARTMENT OF ENERGY

Better Plants Online Learning Series

Webinar Topic	Speaker	Date	Time	Link
7. Energy Treasure Hunts with EPA	Alex Floyd (Tyson) Walt Brockway (ORNL) Walt Tunnessen (EPA)	08/20/20	1:00 – 2:00pm EST	
8. Pumps and Fans	Thomas Wenning (ORNL)	08/27/20	1:00 – 2:30pm EST	
9. Process Heating and Waste Heat Reduction	Sachin Nimbalkar (ORNL)	09/03/20	1:00 – 2:30pm EST	
~~10. Field Validation~~	~~Eli Levine (DOE)~~ ~~Paul Sheaffer (LBNL)~~	CANCELED	Rescheduled Date **TBD**	
11. Energy Management During a Pandemic	TBD	09/17/20	1:00 – 2:00pm EST	
12. MEASUR Tool Suite	Kristina Armstrong (ORNL)	09/24/20	1:00 – 2:00pm EST	
13. Process Cooling	Wei Guo (ORNL)	10/01/20	1:00 – 2:30pm EST	Register

Please go to www.slido.com

using your mobile device, or by opening a new window

Enter Event Code

#DOE

Agenda for Today

1. MEASUR Introduction
2. Software Demo
3. Q&A using Slido

Kristina Armstrong

Oak Ridge National Lab

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Using the MEASUR Tool Suite

Kristina Armstrong
Thomas Wenning
Gina Accawi
Eli Levine (DOE)

Oak Ridge National Labs

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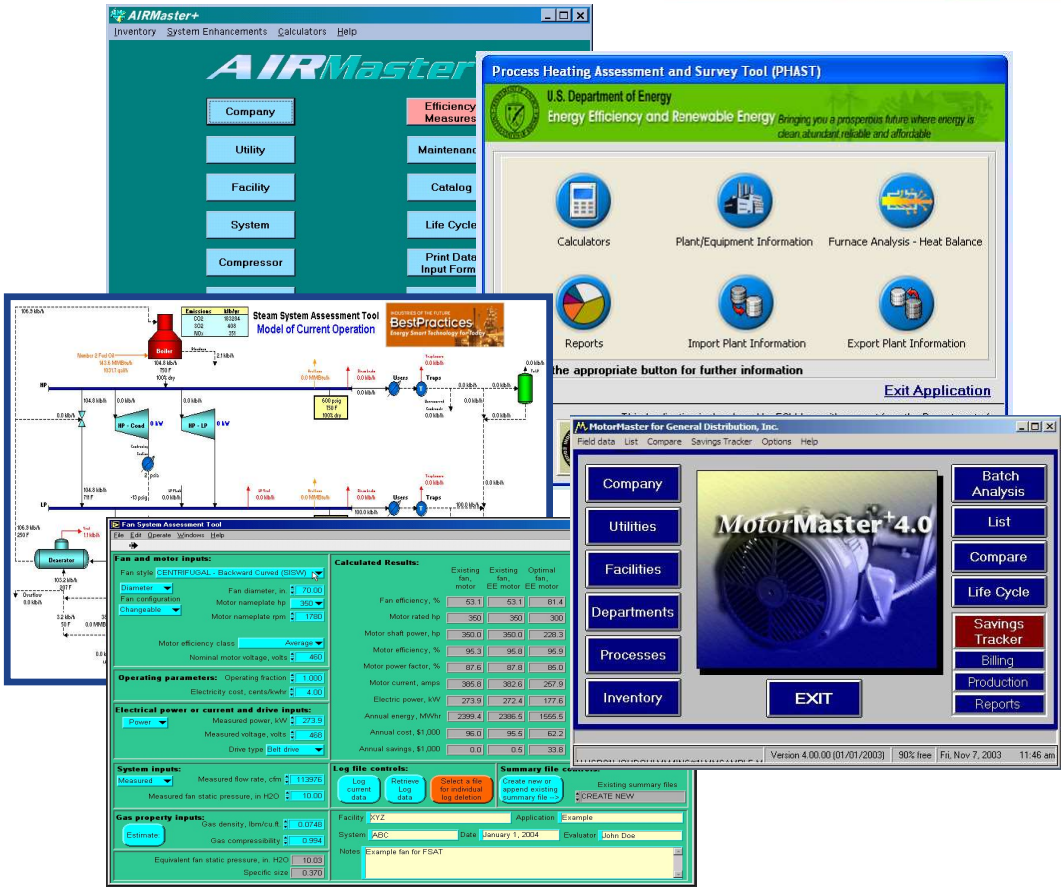
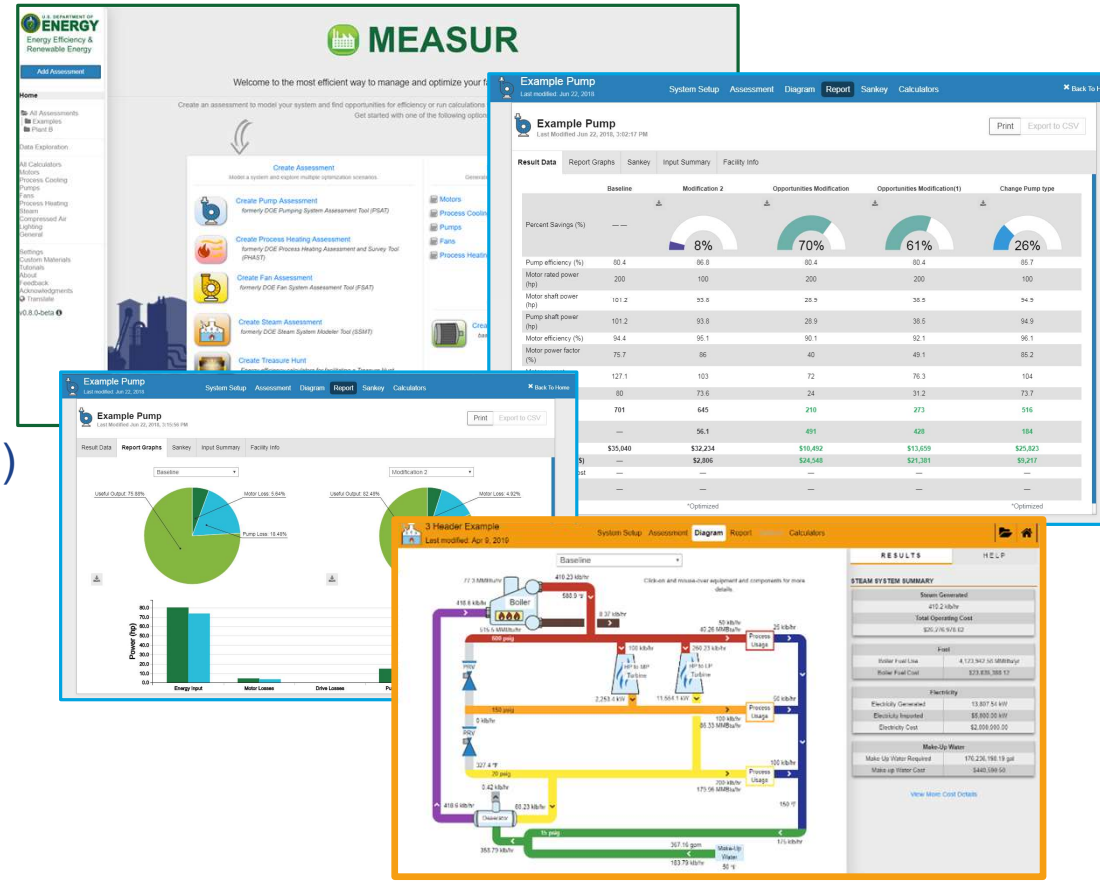
AMO Software Tool History

- Technology & Vender Agnostic tools for energy savings analysis
  - Identify
  - Quantify
  - Validate
- Developed in the ‘90s – ’00s
  - With Industry Experts
  - Many no longer work on today’s operating systems



AMO Software Tool Modernization

- Modern Application
  - Open Source Software
    - GitHub repository: https://github.com/ORNL-AMO
    - Download: https://www.energy.gov/eere/amo/measur
    - All code suggestions approved by team
  - Designed for Multiple Operating Systems (Windows, Mac, Linux, Online)
  - Common software engine library
  - Automatic update notification
- Without sacrifice
  - Still technology/vendor agnostic
  - Using established algorithms with updates from experts

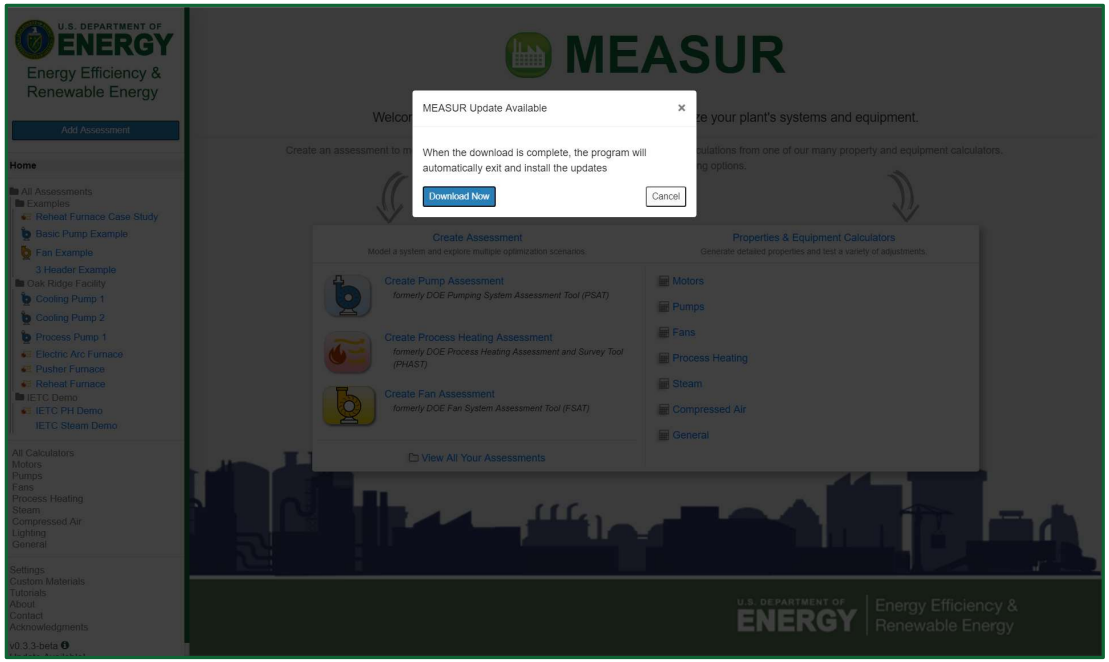


Manufacturing Energy Assessment Software for Utility Reduction - MEASUR

- Model manufacturing energy use and generation
- 6 Assessment types
  - Pumps, fans, process heating, steam, treasure hunt – Beta
  - Compressed air – In Progress
- Inventory
  - Motors – Beta
  - Pumps, fans, compressed air, maintenance - planning
- 50+ Stand alone Calculators
  - Pumps, fans, heating, steam, compressed air, motors, lighting, CHP, etc.

Download via DOE-EERE- AMO website

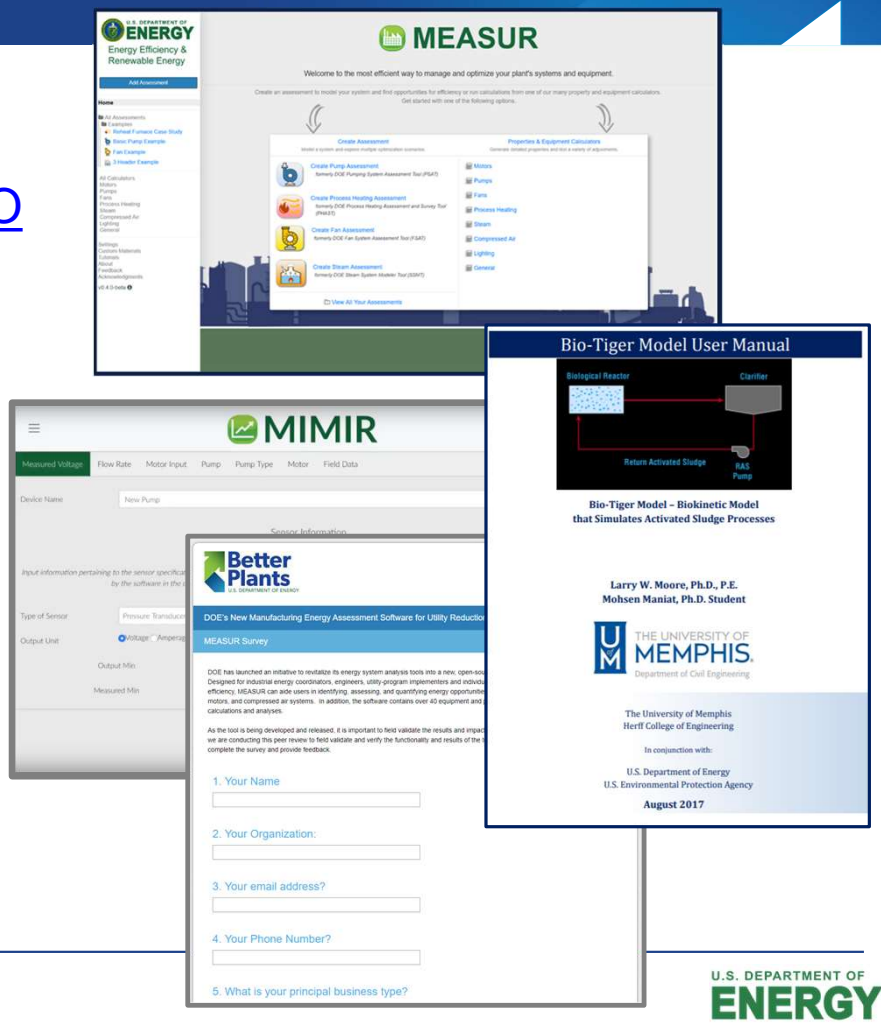
- https://www.energy.gov/eere/amo/measur
- This Tool is in **beta, updates will occur often**
- Automatic notification of update (if connected to internet)
  - **DO NOT UNINSTALL** before updating, you will lose **ALL** your assessments within the tool.



Or Google: AMO Software Tools

Engagement!

- Contribute
  - GitHub repository: https://github.com/ORNL-AMO
  - Dr. Moore's Bio-Tiger Model
  - TN Tech's MIMIR
- Download
  - www.energy.gov/eere/amo/measur
- Feedback
  - https://www.surveymonkey.com/r/DOE-AMO-TOOLS



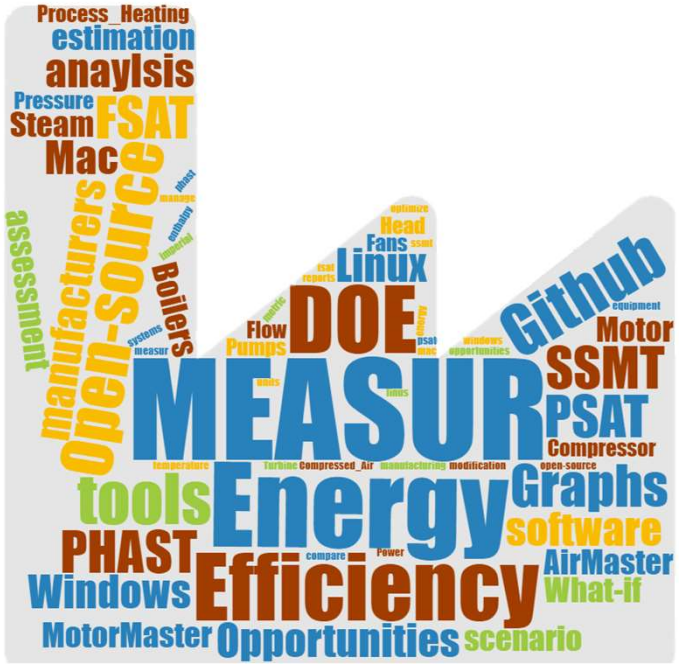
Polls

Tell us about you!

Please go to www.slido.com and enter code **#DOE** to respond

MEASUR Demo

Using MEASUR

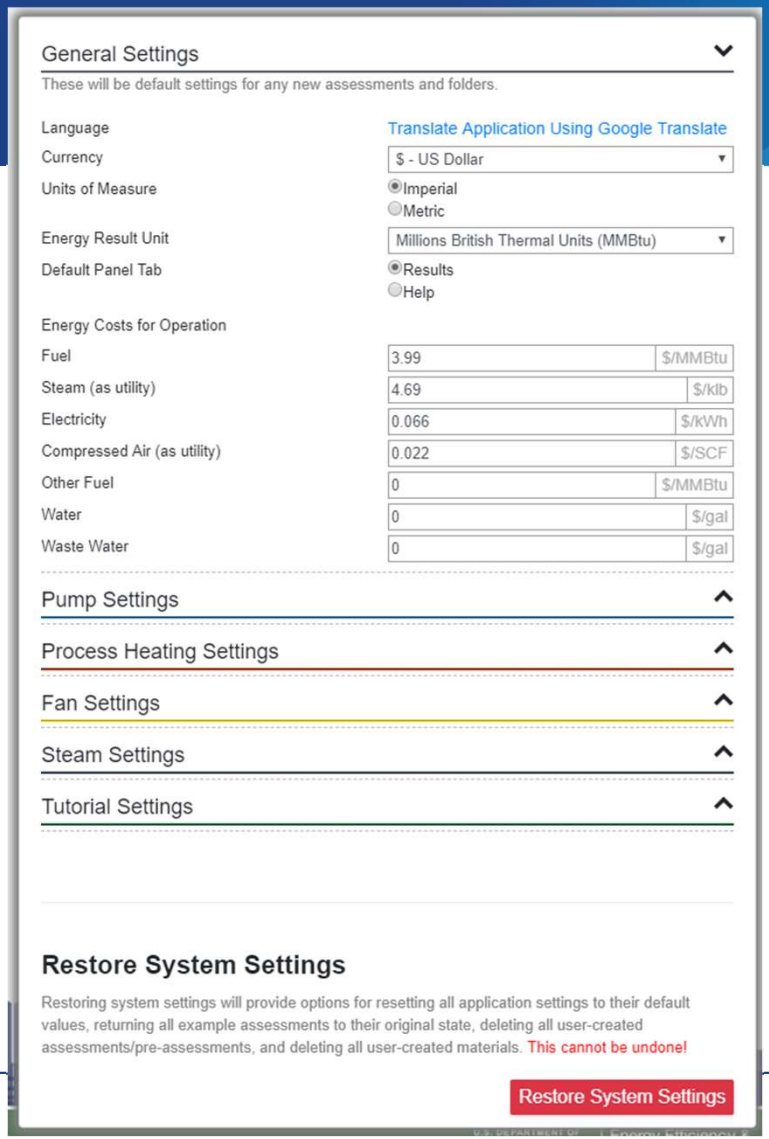


Getting Started

- Start an assessment
- Create an inventory
- View Assessment Dashboard
- Use Properties & Equipment Calculators
- Help and User Experience
  - Change Settings
  - View Tutorials
  - Manage Custom Materials
  - Provide Feedback
  - Translate

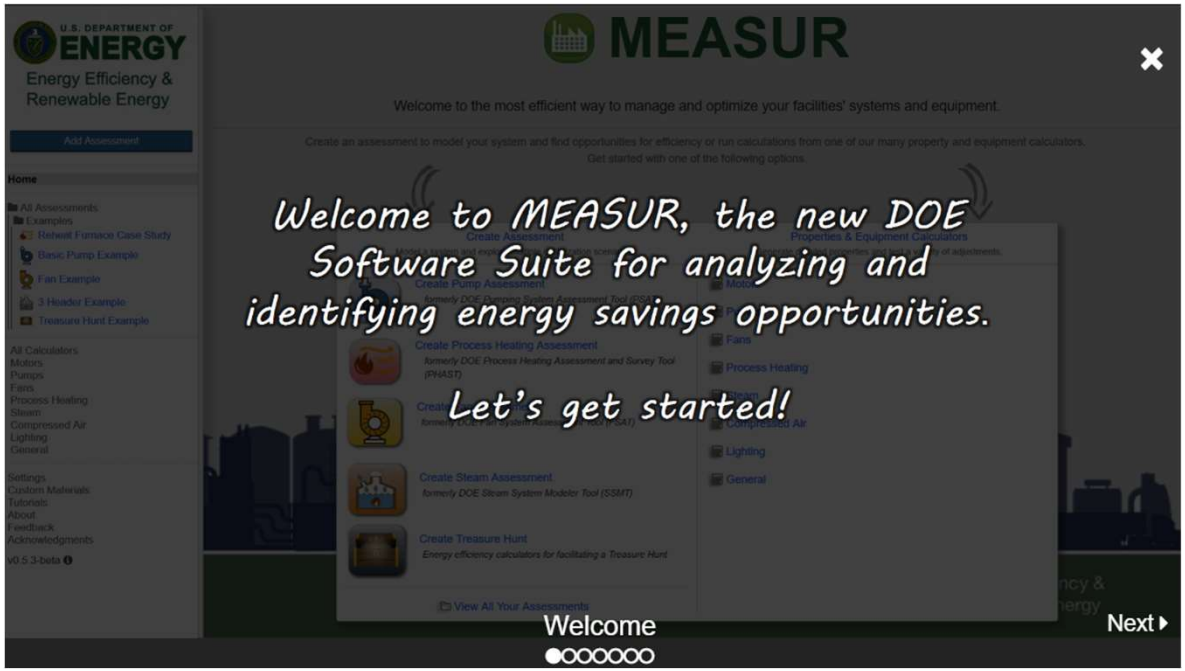
Settings

- Set global units & utility costs
- Change language
  - MUST be connected to internet
- Turn on/off Tutorials
- Clear Data



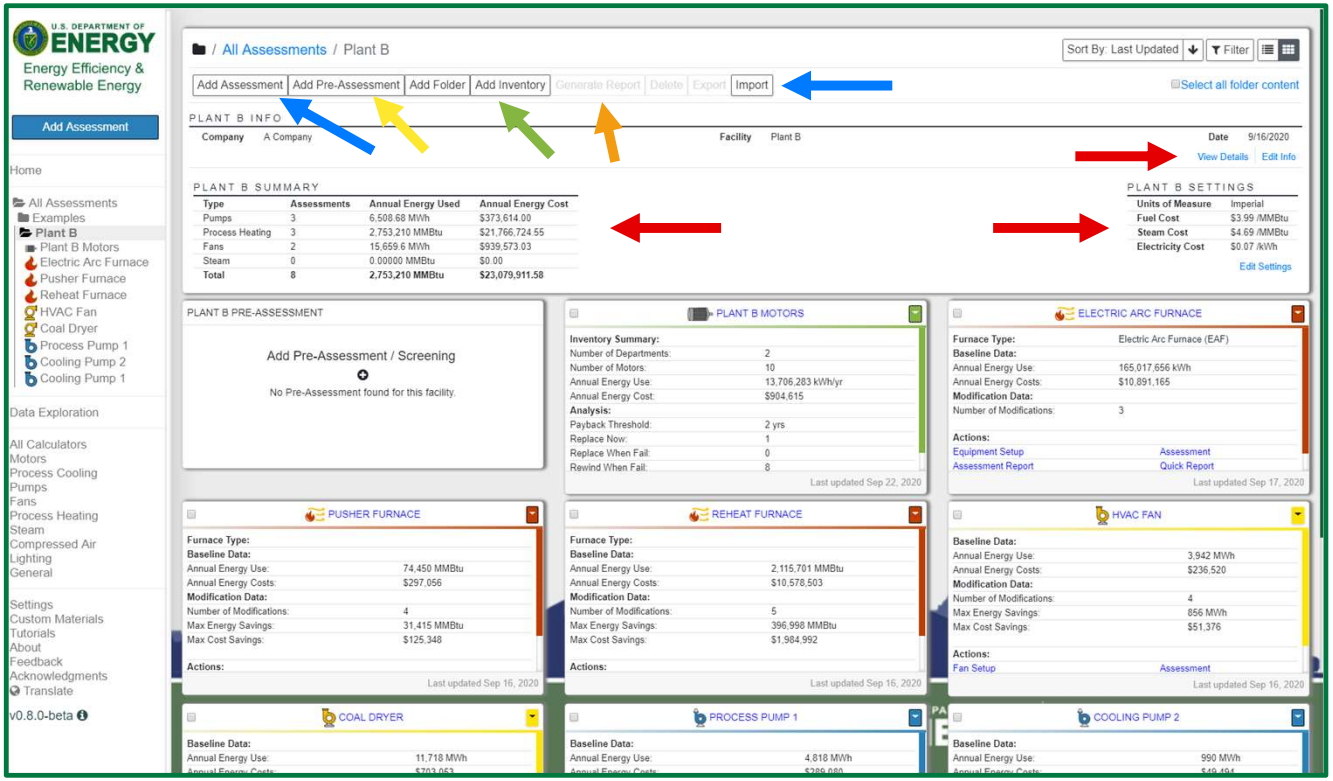
Tutorials & Feedback

- View all Tutorials
- Let us know if you like MEASUR!
  - Survey
- Bug Reporting
  - Email
    - accawigk@ornl.gov
    - armstrongko@ornl.gov
  - Download full Data set
    - This will help us identify the problem
  - Screenshots please



Dashboard - Overview

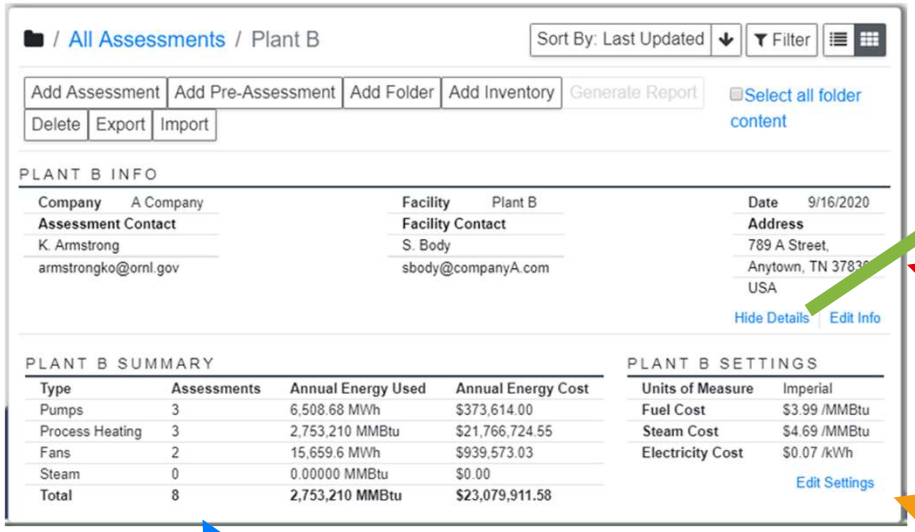
View all your assessments in a folder-based organization

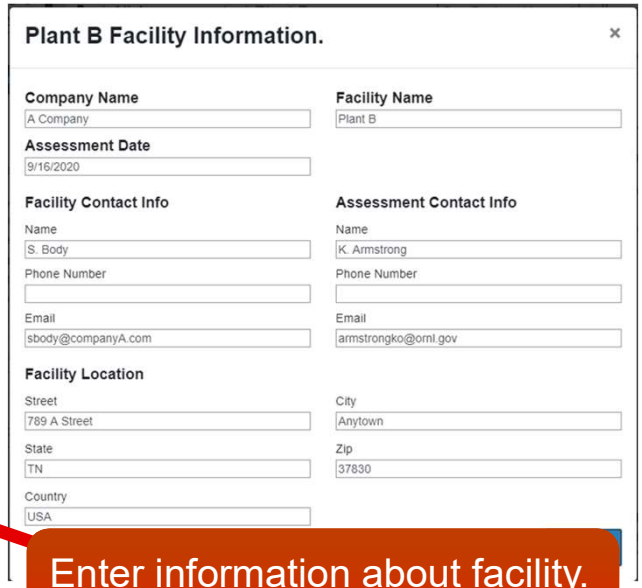


- Move, copy, import and export assessments
- Add/view facility information and folder-wide settings
- Make pre-assessment screenings
- Generate rollup reports of several assessments
- Add New Assessment
- Add New Inventory

Dashboard – Folders are Facilities

The Dashboard is designed to treat each folder like a facility or business unit





Enter information about facility. This will appear in reports

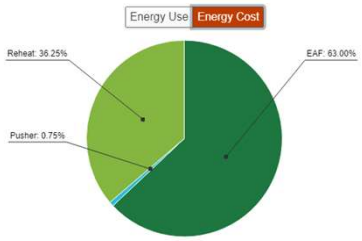
Quick Summary of all assessments in folder

Set units and utility costs for any NEW assessments created

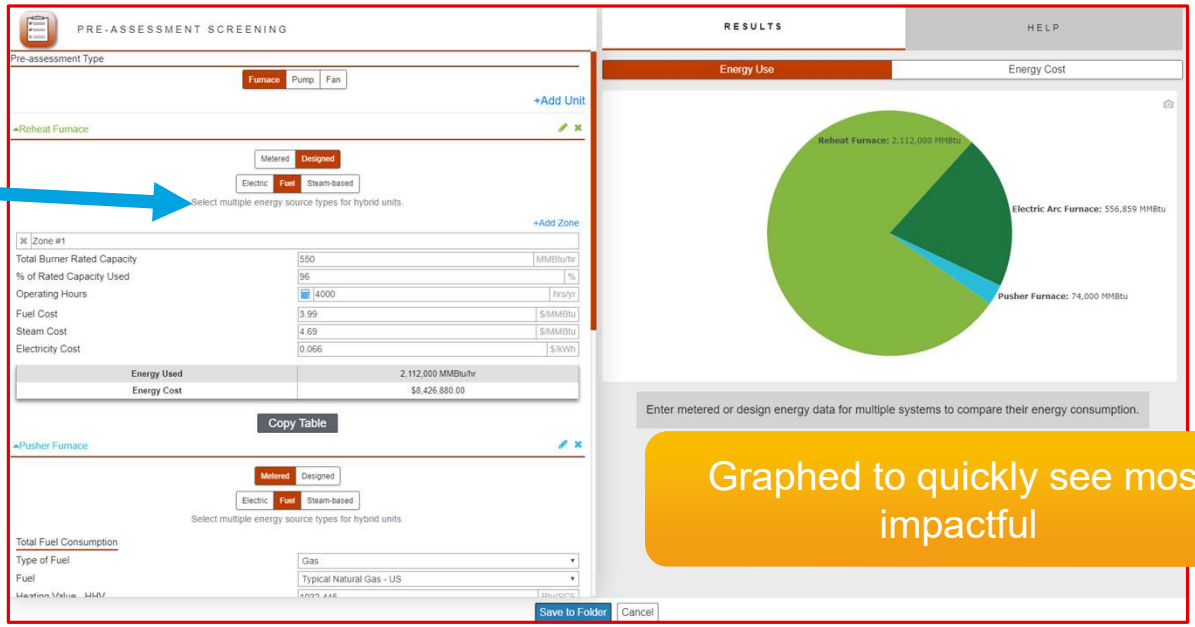
Dashboard - Pre-Assessments

Pre-Assessments are to help you triage equipment to best utilize assessment time

Enter either design specifications or meter data to determine your priorities



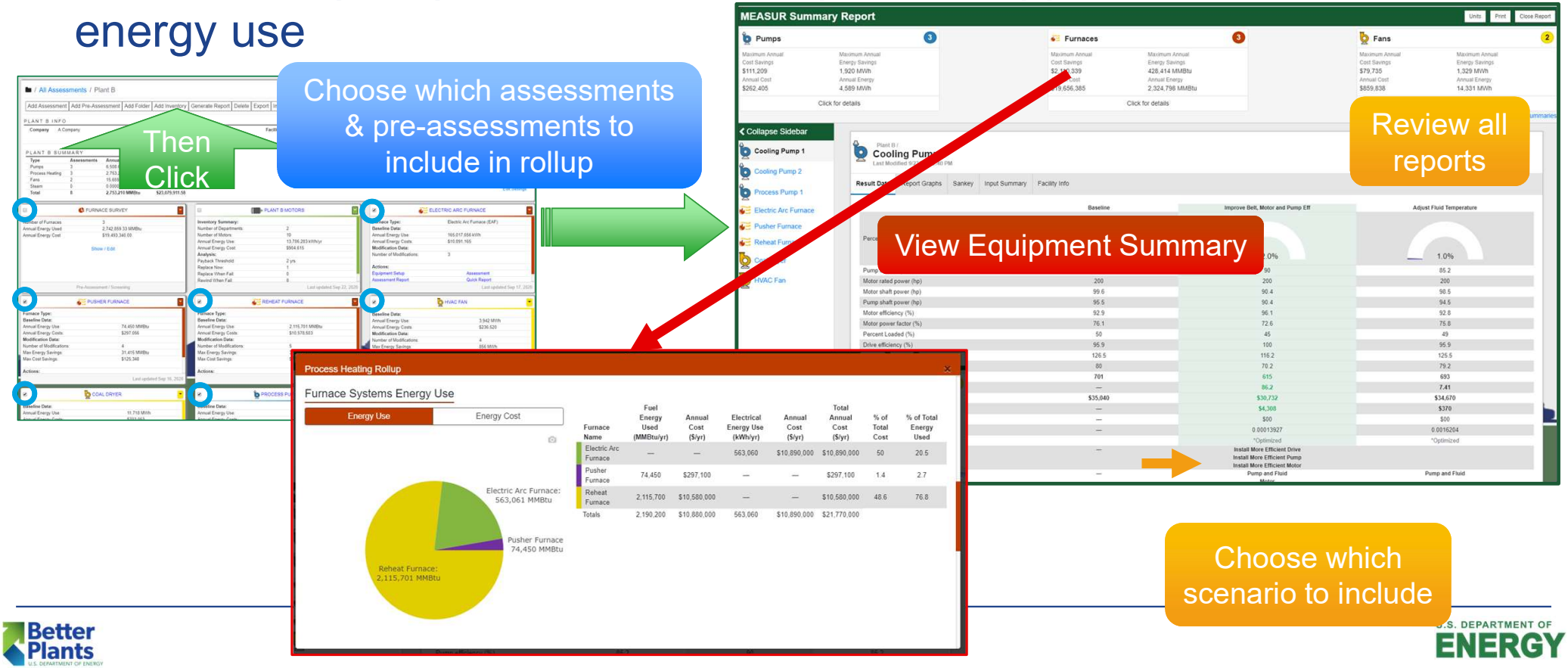
Switch between Energy Use and Cost if equipment uses different fuel



Graphed to quickly see most impactful

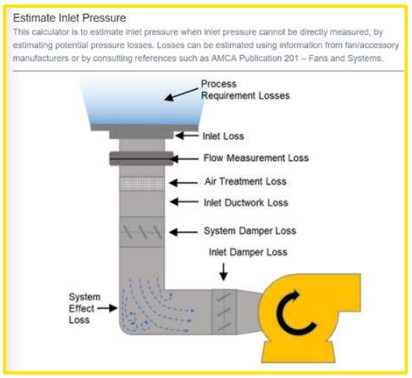
Dashboard - Rollup Reports

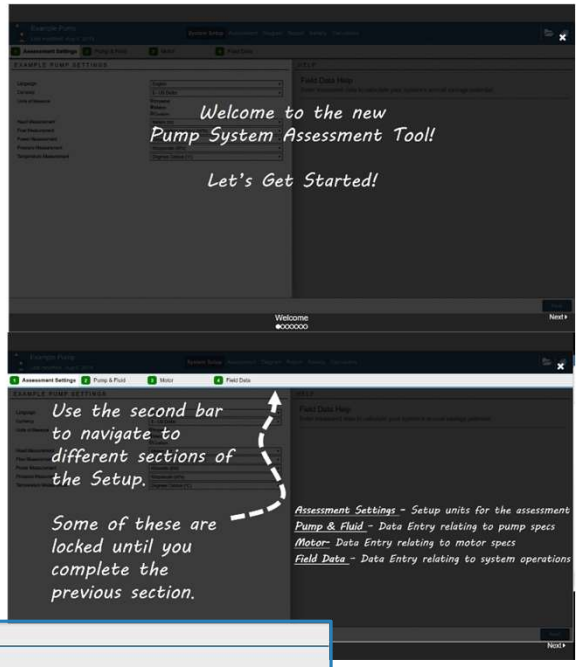
Create Rollup Reports to see the impacts of opportunities on overall energy use

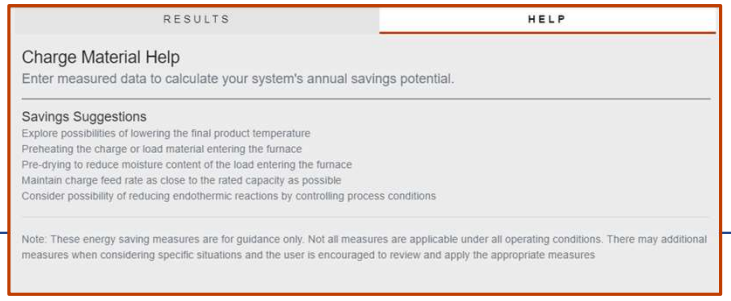


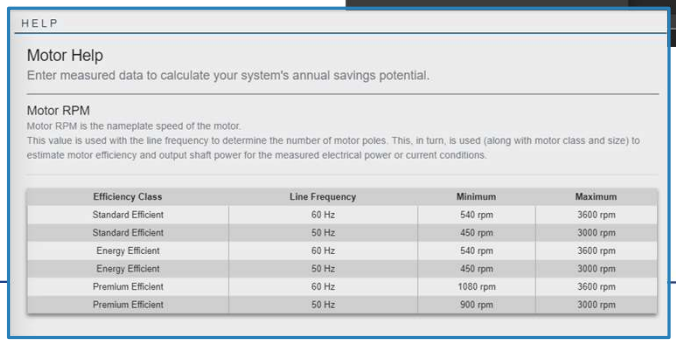
Key Features - Help Text & Tutorials

- Tutorials
  - Help to get started using tool
- Help text for each data entry field
  - Diagrams to help understand where to obtain data
  - Can switch between help or results being shown by default



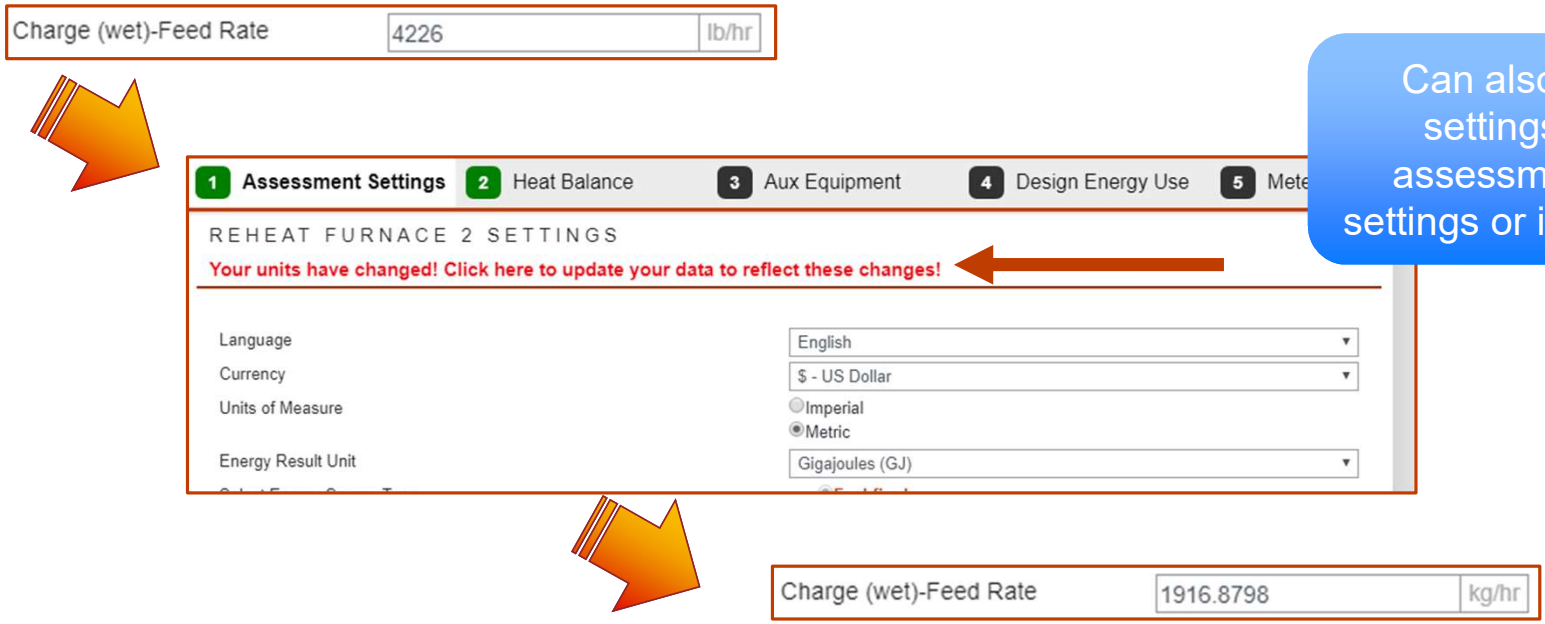




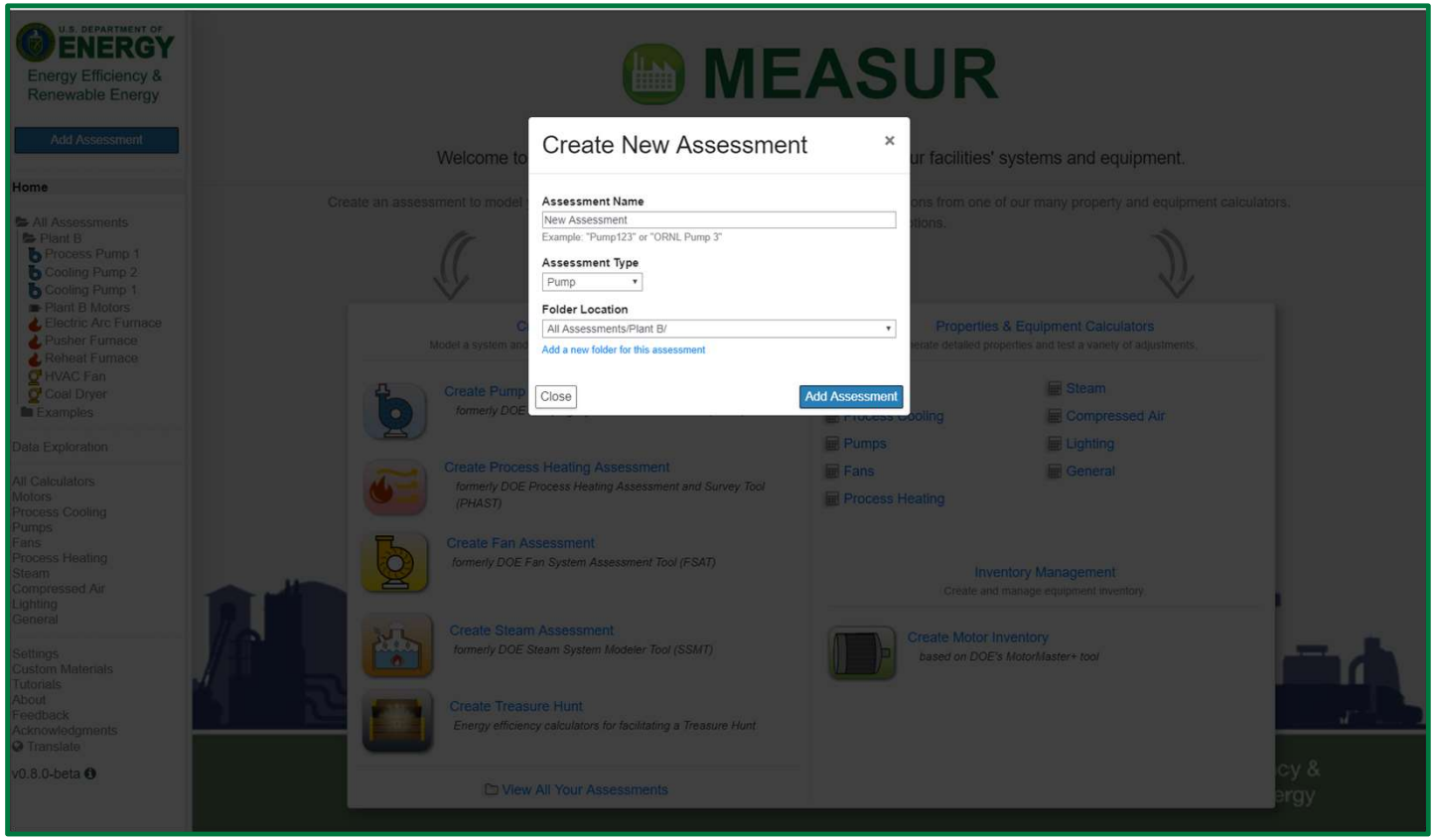


Key Features – Customize Units & Notes

- Units are easily customizable and can be changed after data entry!
- Add notes on assessment conditions to add to report

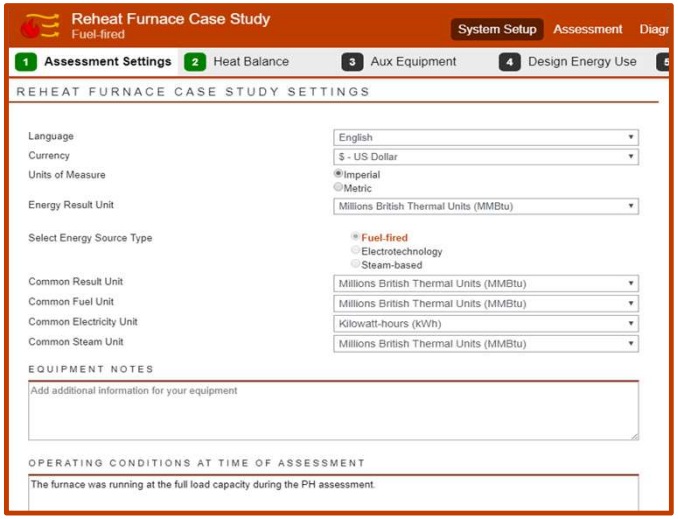


Starting an Assessment

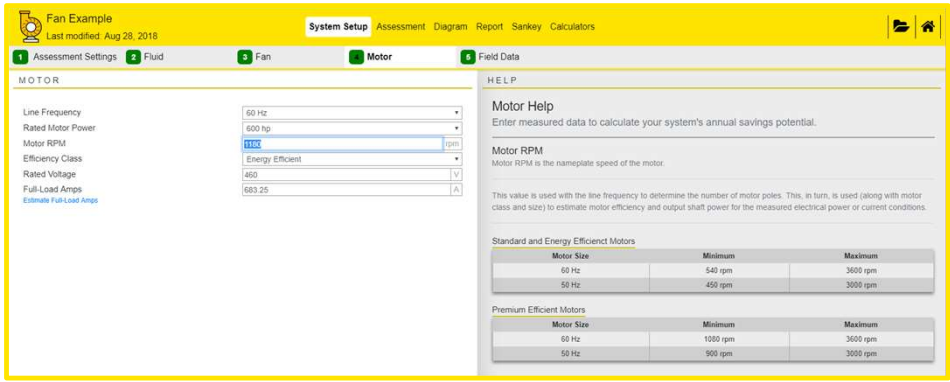


- Choose a unique name for the assessment
- Set Assessment type (Pump, Fan, Process Heater, Steam, Treasure Hunt)
- Choose folder location
  - Or make a new folder

System Setup



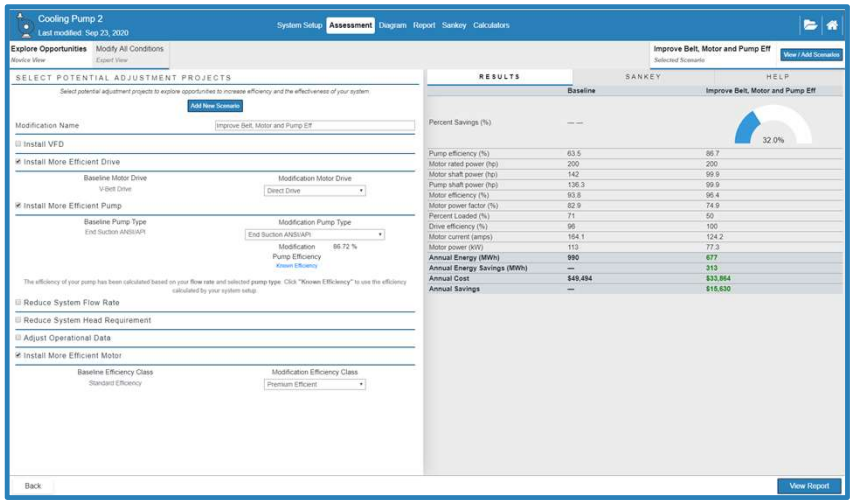
Start with current equipment and operations - Baseline

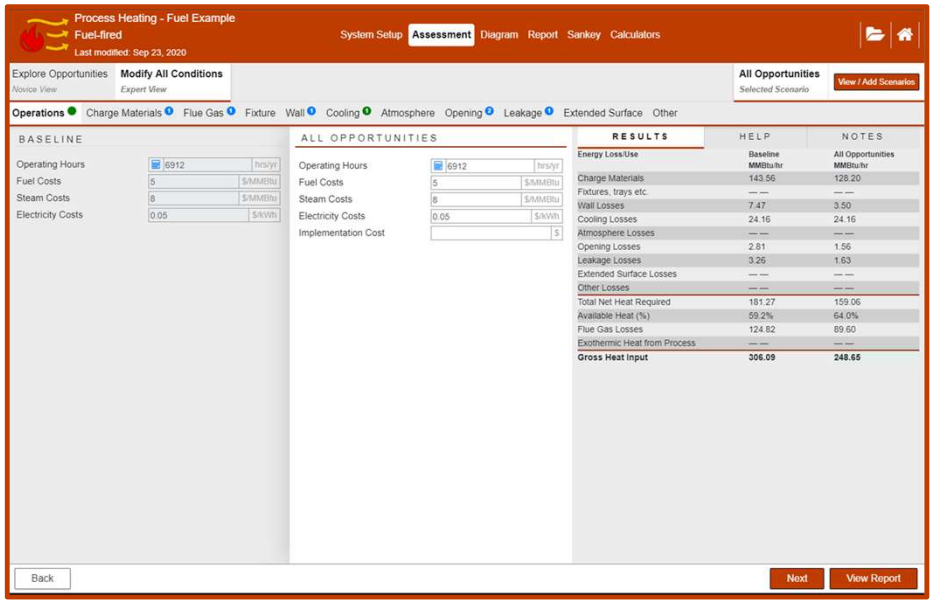


- Assessment Settings: Set units and basic assessment settings
- Assessment Specific Tabs
  - Data Entry for baseline assessment
  - Intermediate Results
  - Help text for each data entry field

Assessments

Explore energy savings opportunities

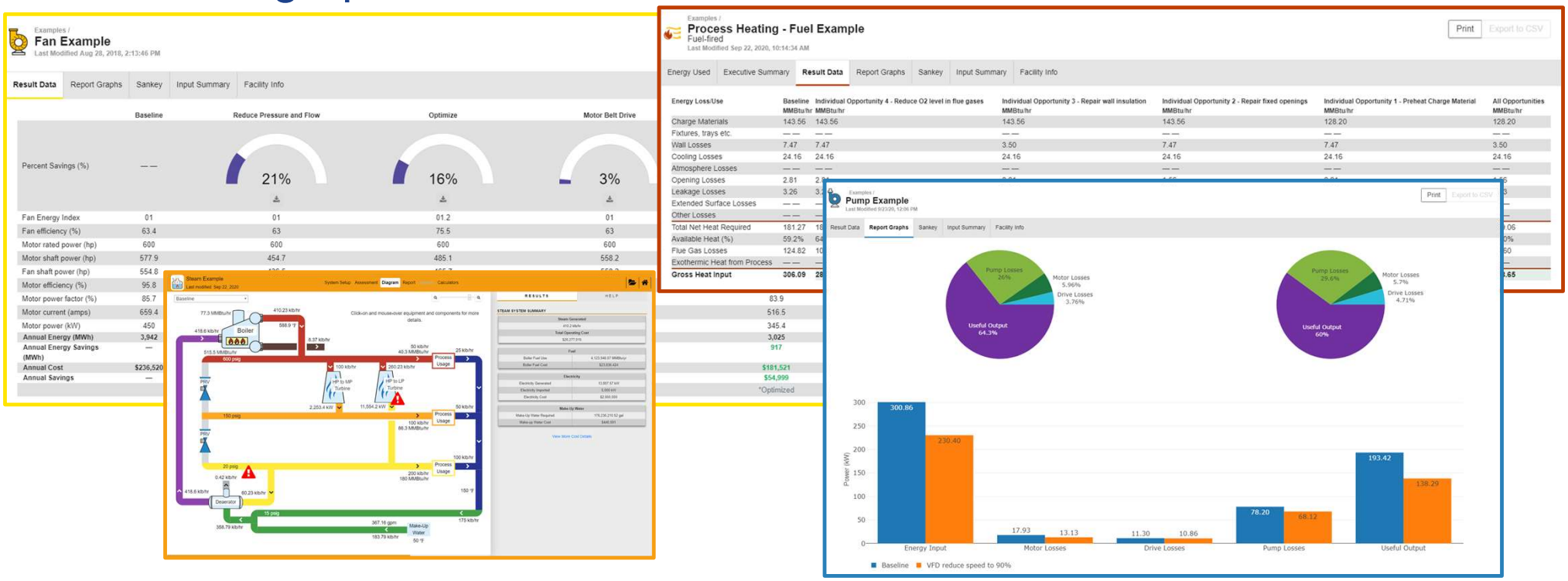




- Explore Opportunities: build scenarios from pre-established energy savings measures
- Modify All Conditions: build scenarios using same forms as baseline
  - Badges and field highlighting for visual cues

Reports

View side-by-side comparison of all scenarios and graphs for data visualization



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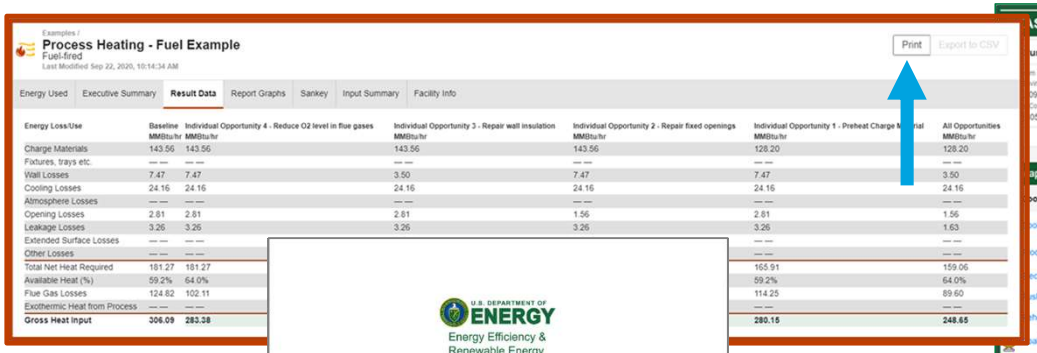
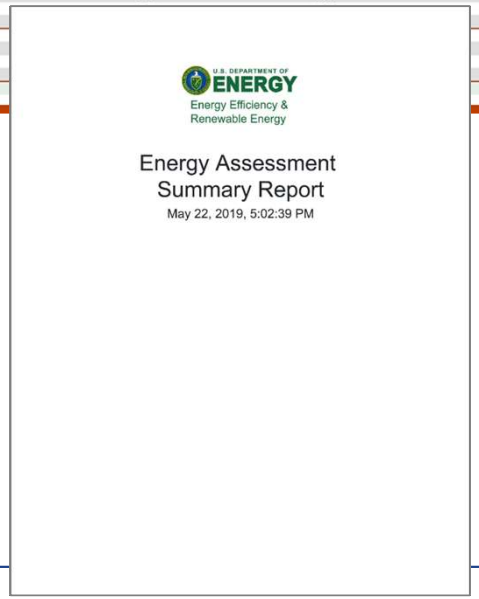
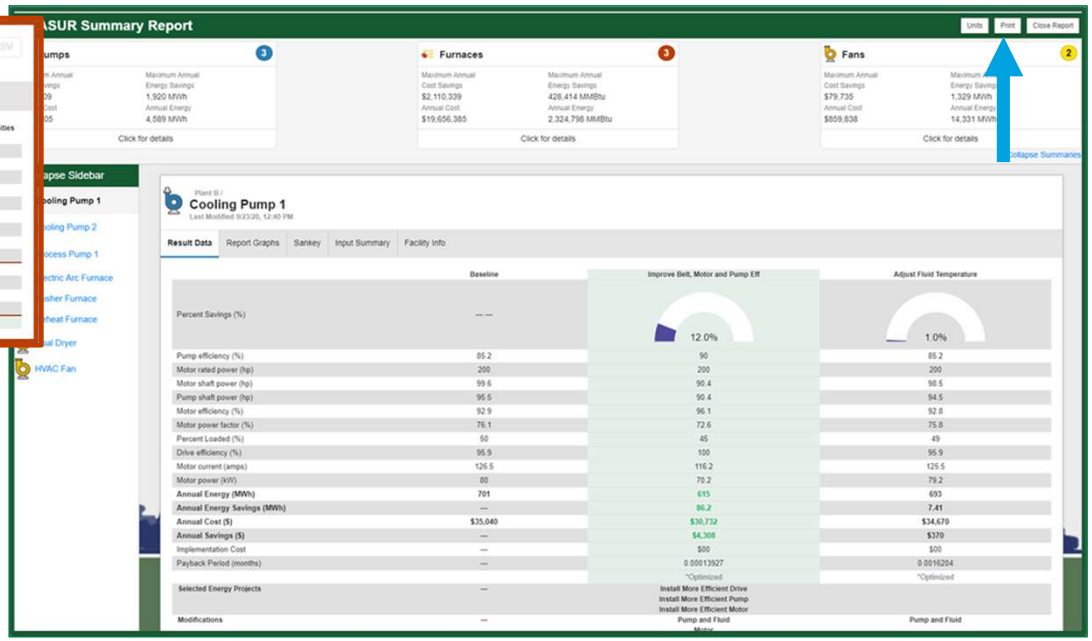
Reports - Printing

Print to PDF for Assessment Reports & Rollup Reports



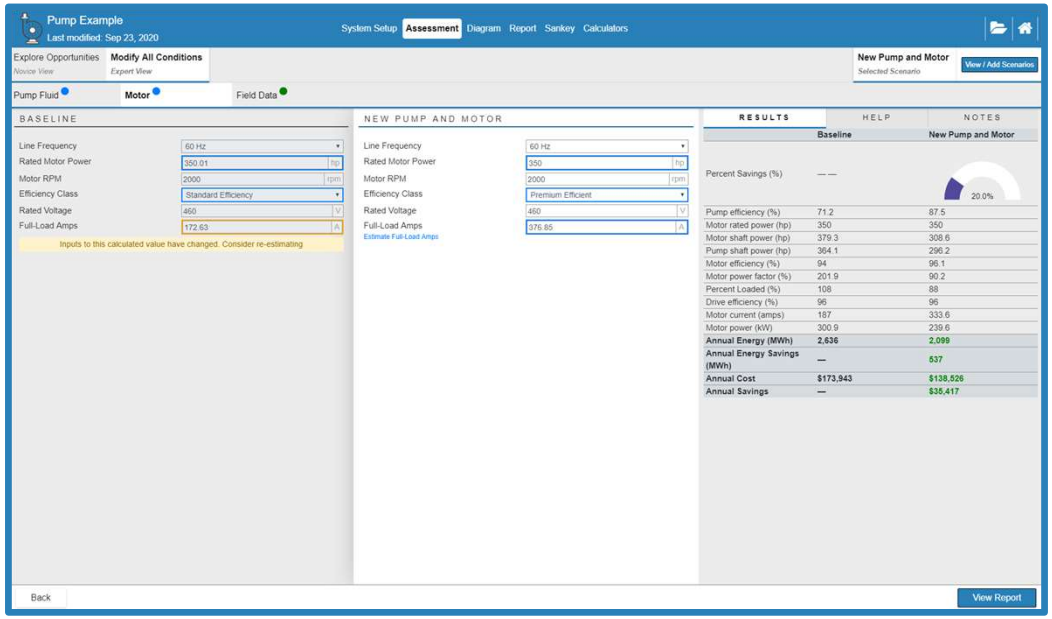


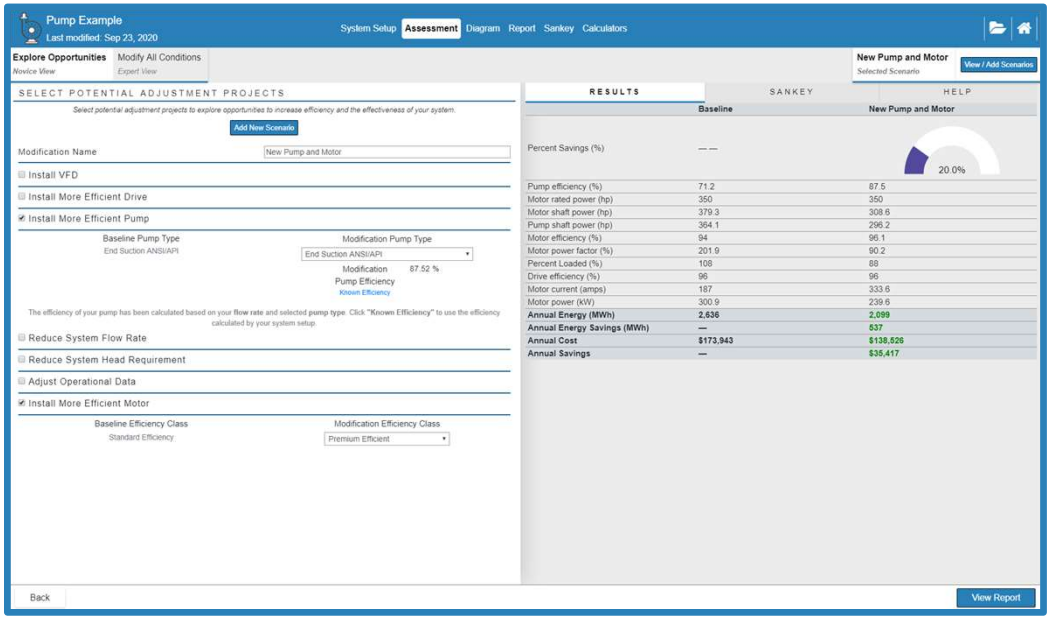


Assessments

- 5 different assessment types
  - Pumps
  - Process Heating
  - Fans
  - Steam System
  - Treasure Hunt

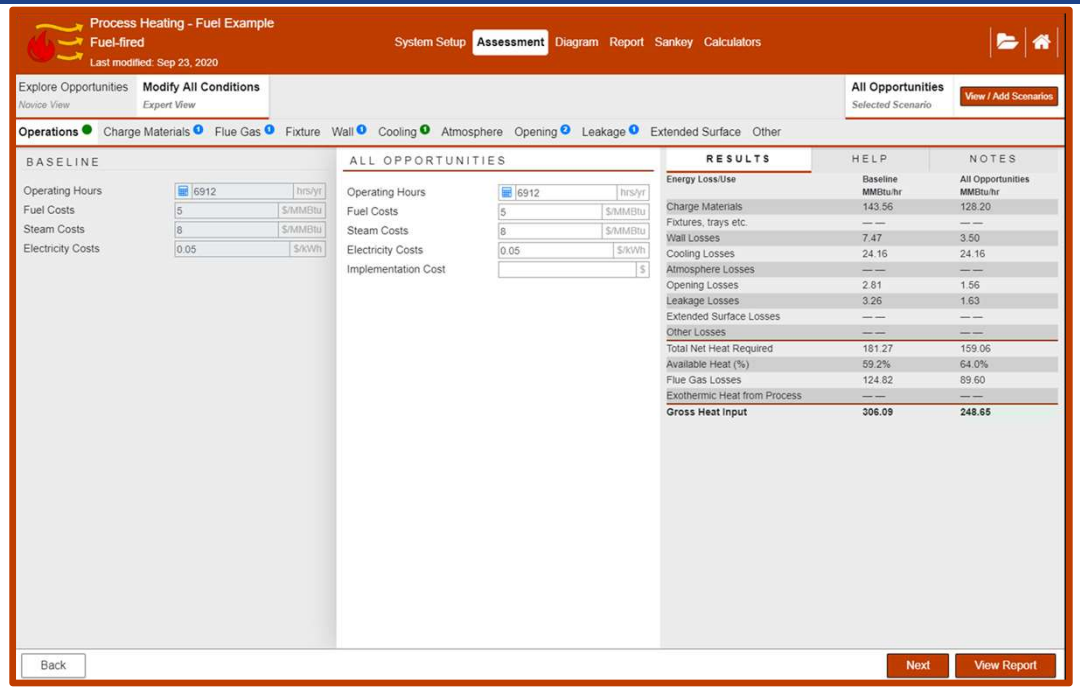
Pumps

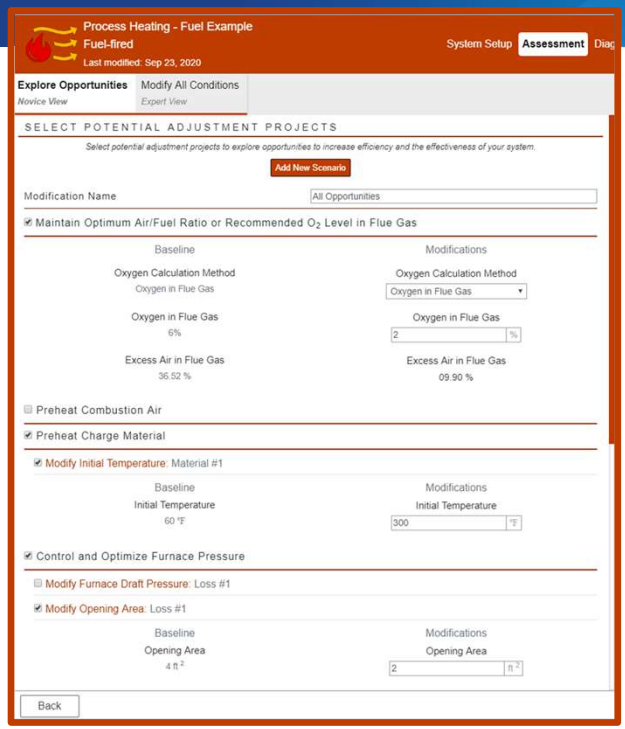




- Compute motor full load amps, load current and power factor, fluid head, and fan and motor efficiency
- Explore the savings from changing pump and motor efficiency (which can be optimized automatically), flow and head, or even fluid temperature

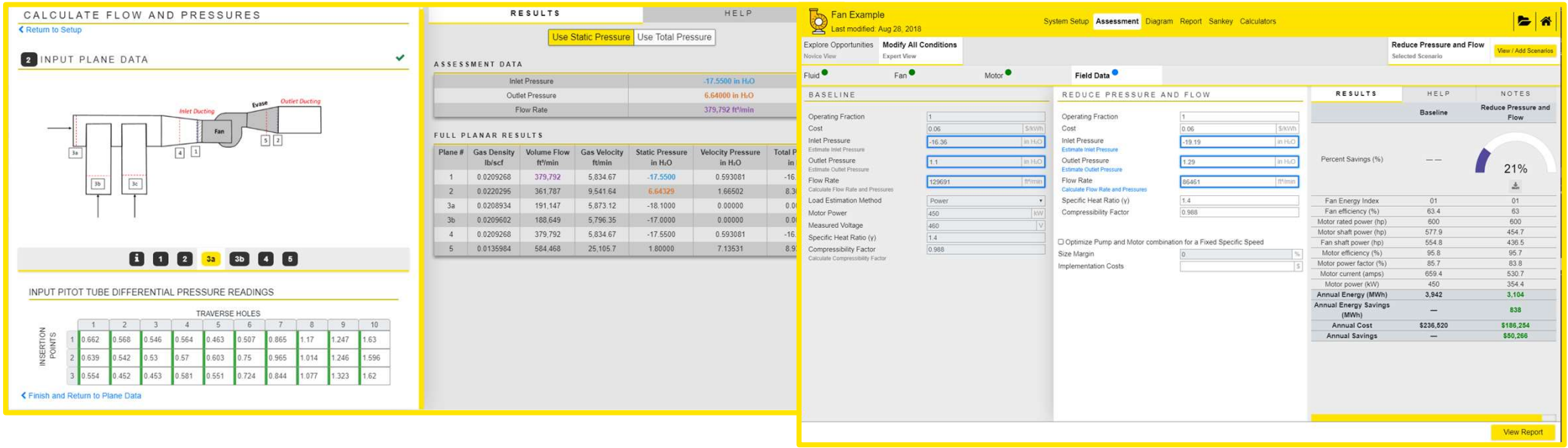
Process Heating





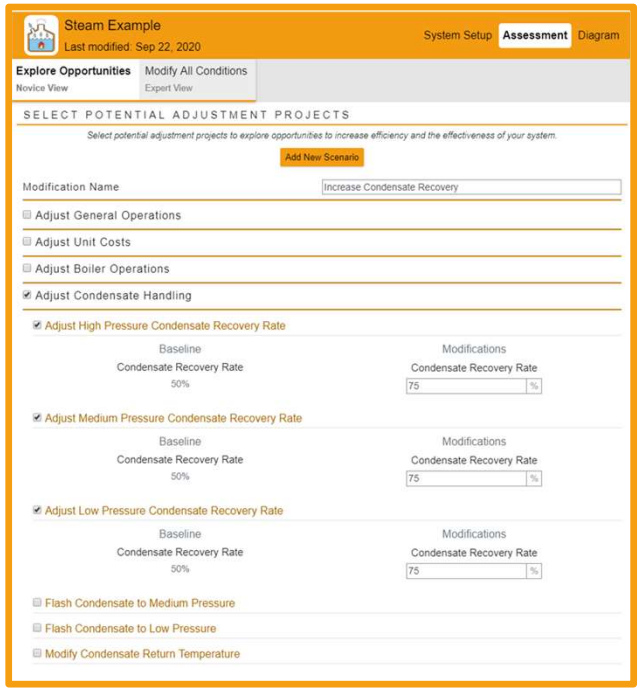
- Calculate heat losses from several heater components
- Explore the savings from reducing flue gas oxygen or temperature, preheating air or charge materials, controlling furnace pressure, closing openings, etc.

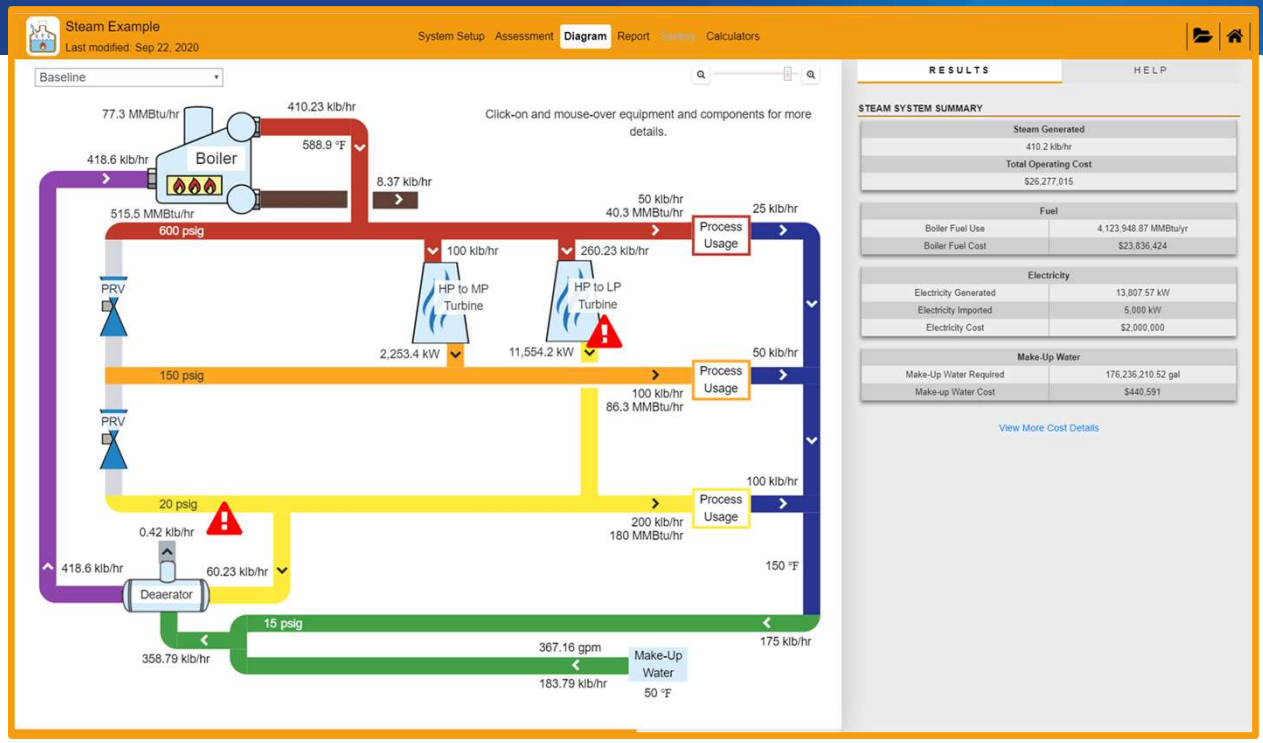
Fans



- Compute motor full load amps, load current and power factor, pressure and flow from a traverse analysis, and fan and motor efficiency
- Explore the savings from changing fan and motor efficiency (which can be optimized automatically), flow and pressure, or even fluid characteristics

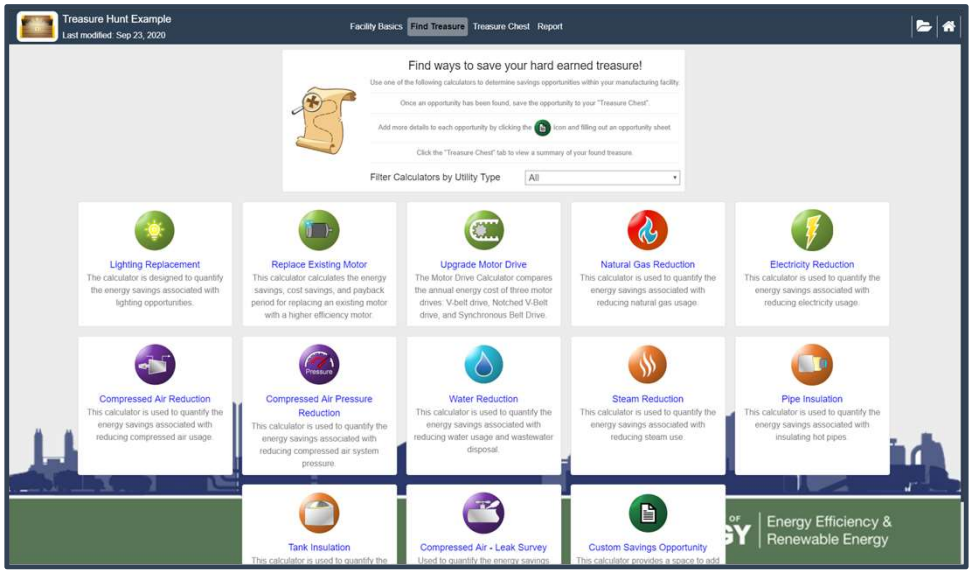
Steam

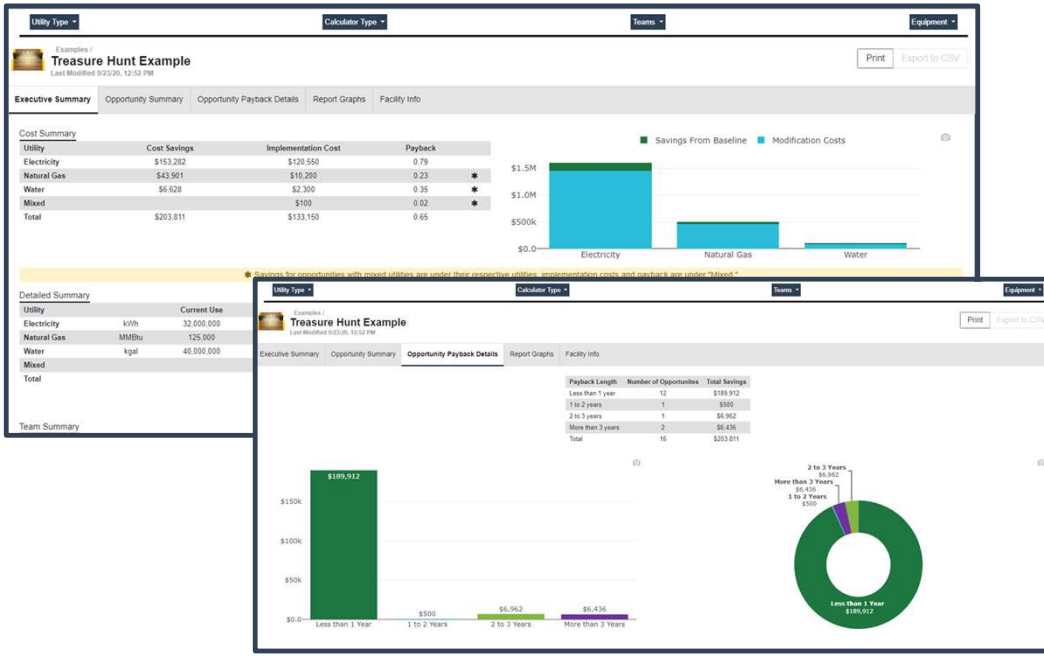




- Determine steam flows, fuel use, electricity production throughout system
- Explore the savings from adding/removing turbines, adding flash tanks, increasing condensate recycle, etc.

Treasure Hunt

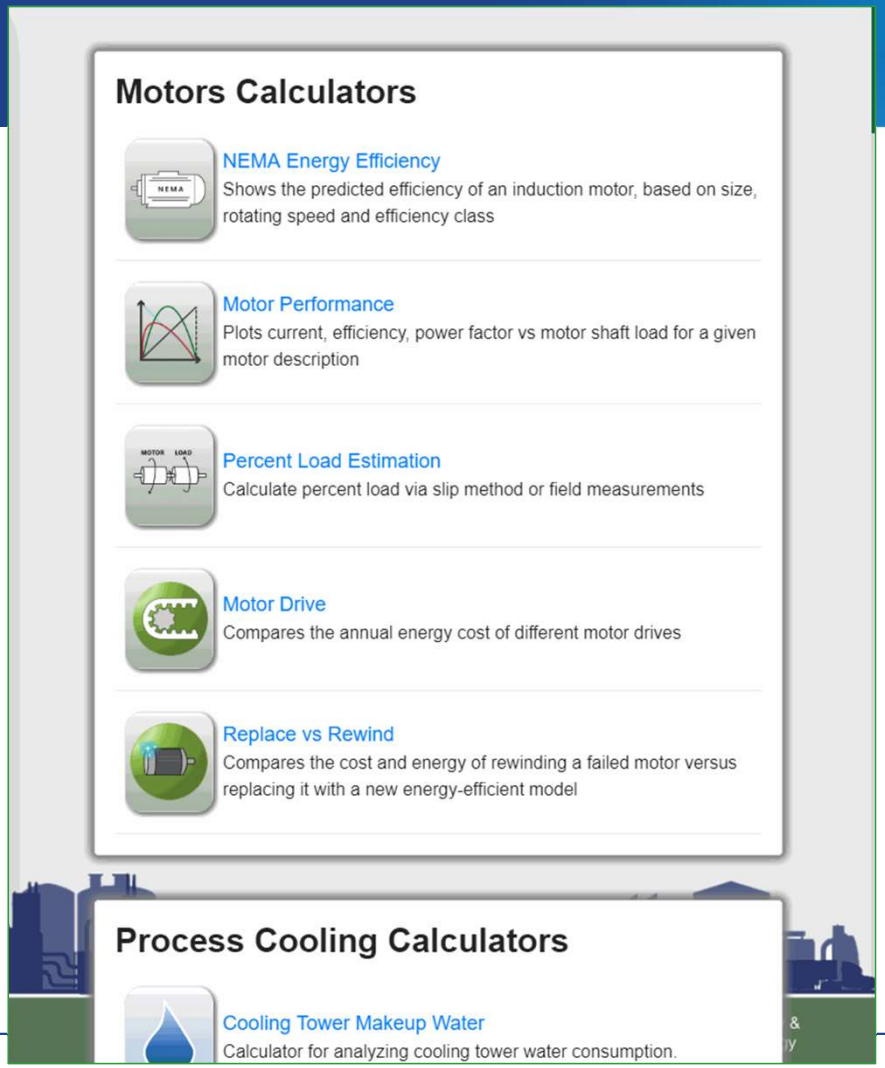




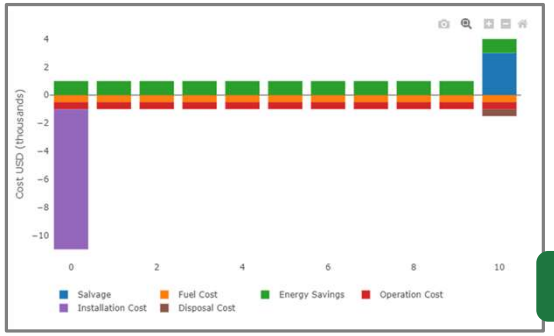
- Find low/no cost energy savings opportunities in motor systems, process heating, compressed air, lighting, etc.

Calculators

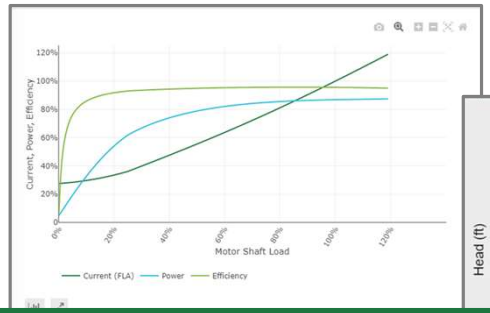
- 50+ Stand alone Calculators
  - Motors
  - Pumps
  - Fans
  - Process Heating
  - Steam
  - Compressed Air
  - Lighting
  - General
- Most have graphical results



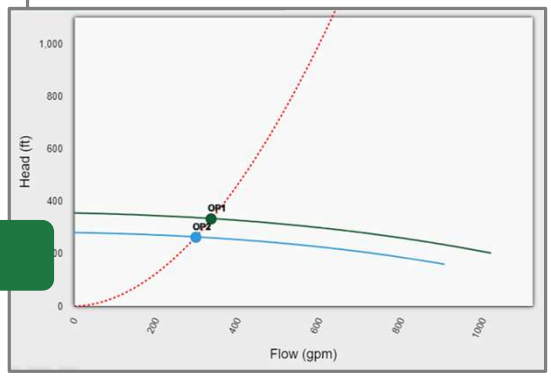
Example Calculators



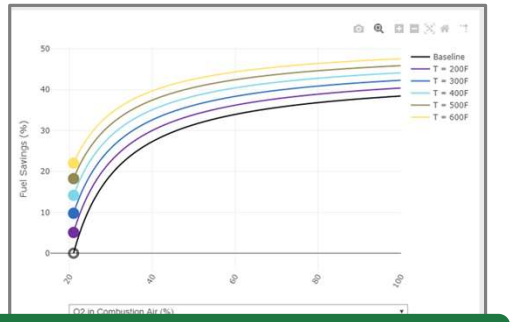
Cash Flow Diagram



Motor Performance

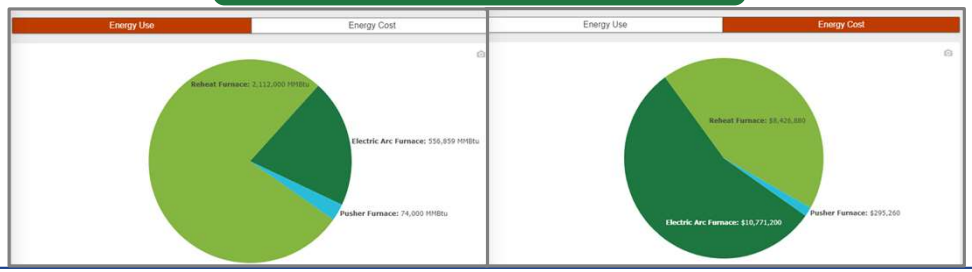


Pump Curve



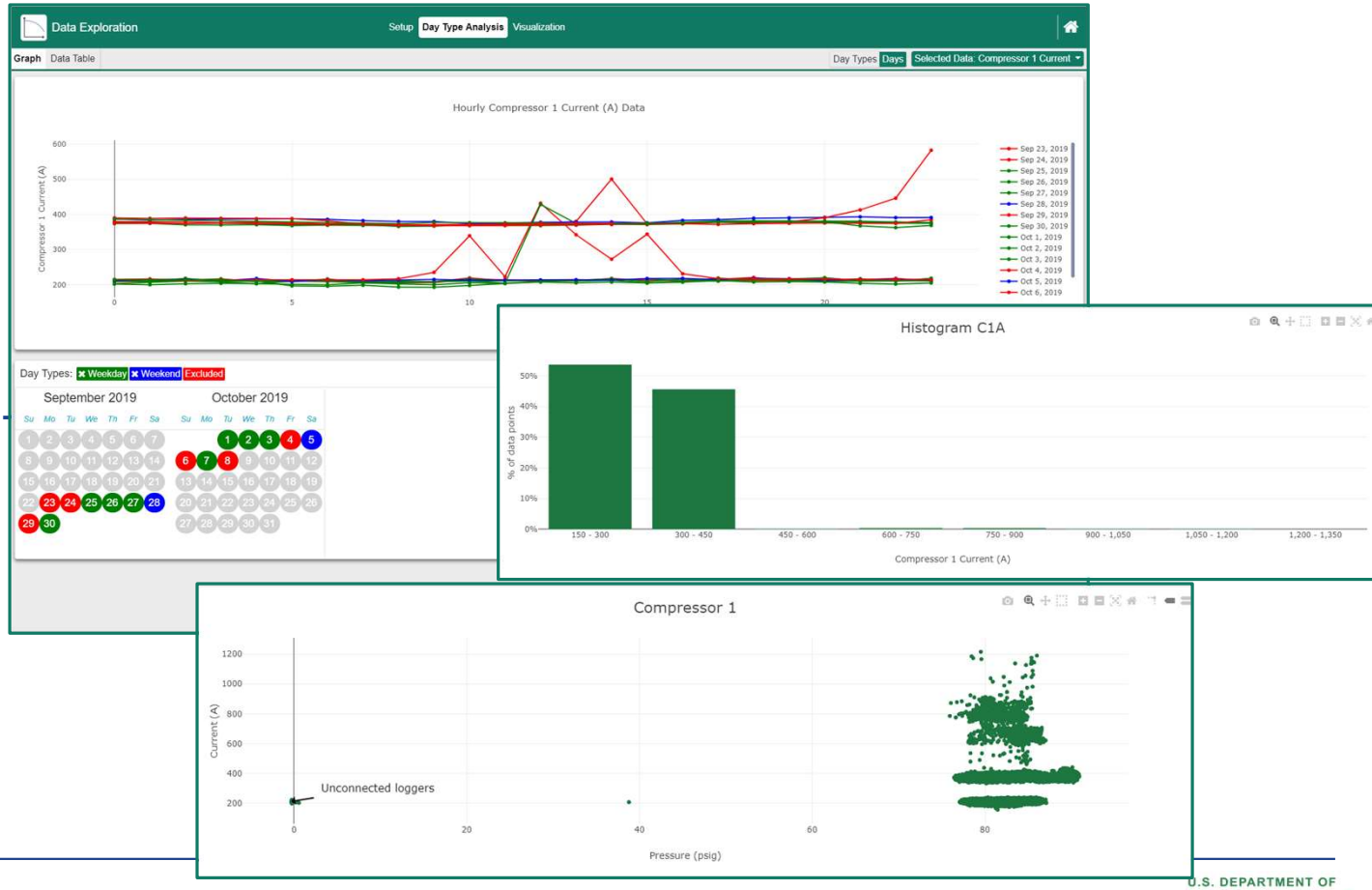
O_2 Enrichment

Pre-assessment



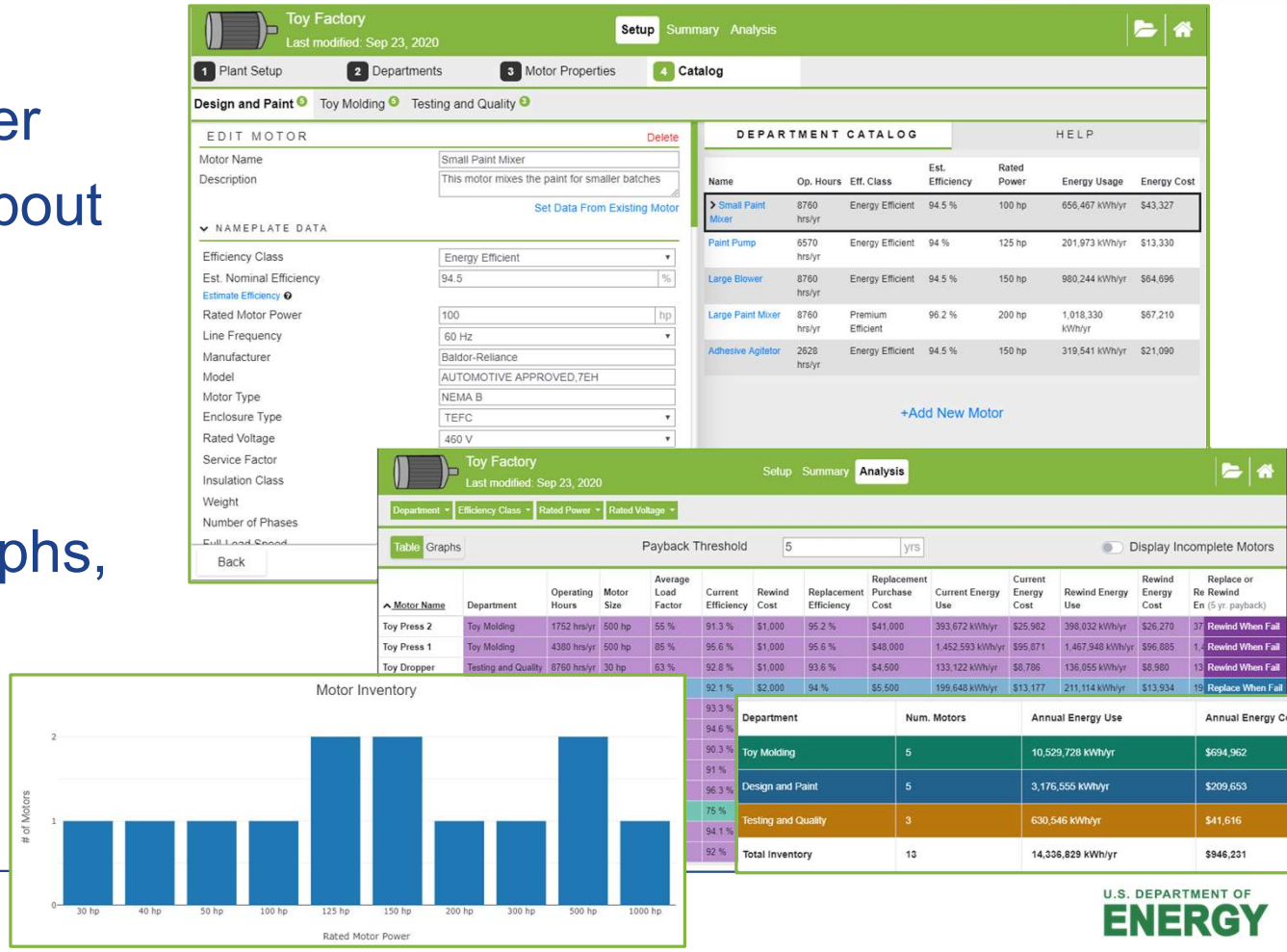
Data Explorer

- Two Key Functions
  - Day Type Analysis
    - Used for finding hourly averages for similar load profiles
    - For Compressed Air Assessment and other long-term analyses
    - Based on LogTool
  - Data Visualization – easy graphing capabilities to explore large datasets



Equipment Inventories

- Modeled after MotorMaster
- Record key information about equipment in one place
  - Motors – Beta
  - Pumps, fans, compressors, maintenance - Planning
- Sort & filter, summary graphs, inventory printouts
- Batch analysis for simple calculators



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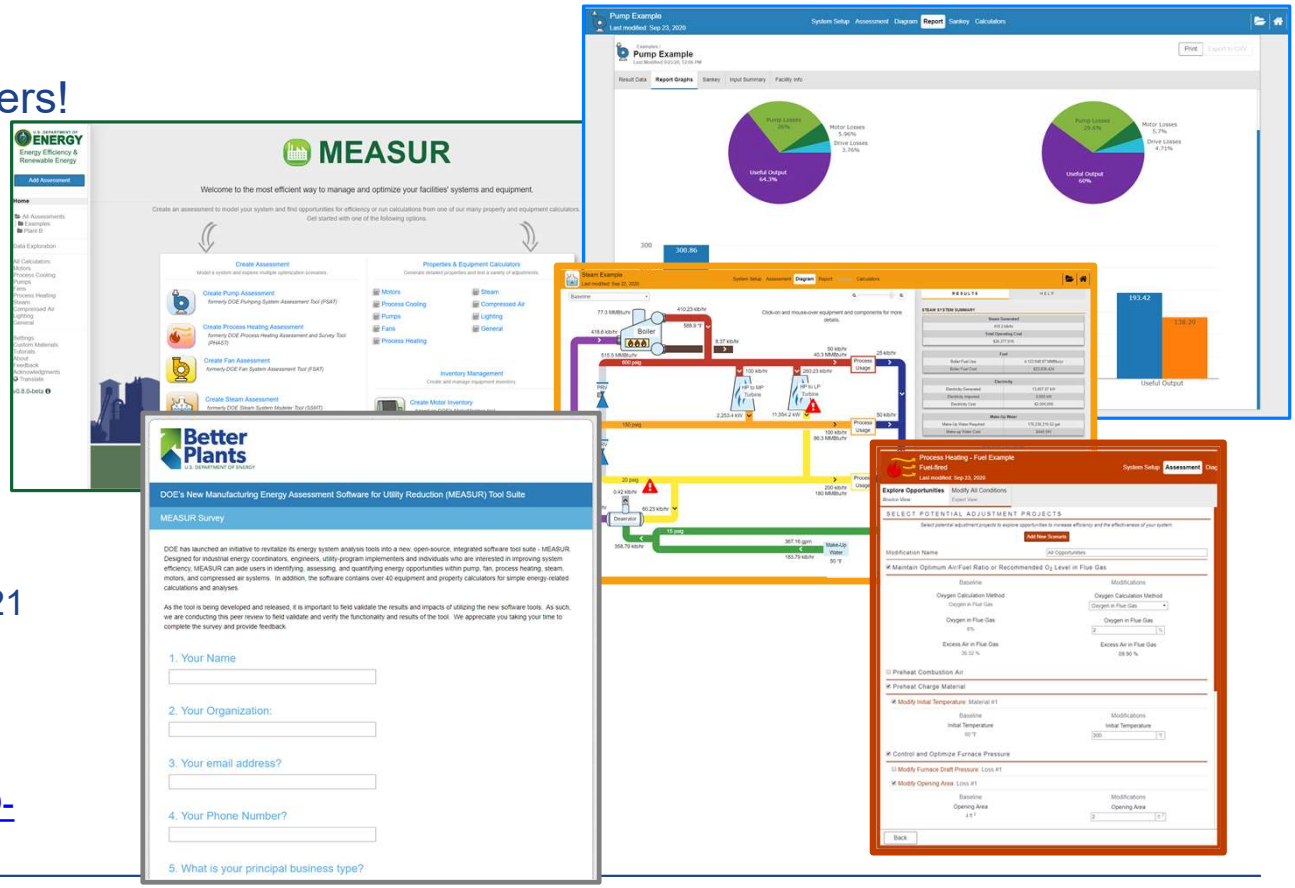
Coming Soon

- Compressed Air Assessment
  - Modeled after AirMaster+ with LogTool
  - Conduct Compressed Air Energy Assessment
  - Quantify Energy Savings Opportunities
- More Equipment Databases
  - Modeled after MotorMaster+ Database
  - Keep inventory of equipment (pumps, fans, compressors, etc.) connected to assessments

Results and Accomplishments

- **Community Engagement**:
  Key Point – want to engage end users!
- Tool Development Schedule
  - Systems completed:
    - Process Heat (PHAST)
    - Pumps (PSAT)
    - Fans (FSAT)
    - Steam (SSMT/SSAT)
    - Treasure Hunt
    - Motor Inventory
  - Under Development:
    - Compressed Air (AirMaster+) – 2021
    - Inventory – 2021
- www.energy.gov/eere/amo/measur
- Ongoing Feedback link - https://www.surveymonkey.com/r/DOE-AMO-TOOLS



Transition (beyond DOE)

What will this effort help enable going forward?

- **Open-Source** Library Suite - https://github.com/ORNL-AMO
  - Greater transparency
  - Future-proofing
  - New algorithms can be added to characterize other plant processes and equipment
  - Equipment providers can develop equipment specific databases that interface with the tool
- Library can be used to **effectively test** real-world equipment performance versus theoretic capabilities
- **Leverage sensors** for real-time data collection, monitoring and optimization
  - Leverage the Internet of Things devices coming online within manufacturing
- Enable **real-time system analysis and optimization**
  - Possibilities for exploring machine learning algorithms for system optimization

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Subject Matter Experts

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  - Contributed algorithms for the new version of FSAT
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Q & A

Submit Questions
www.slido.com event code **#DOE**

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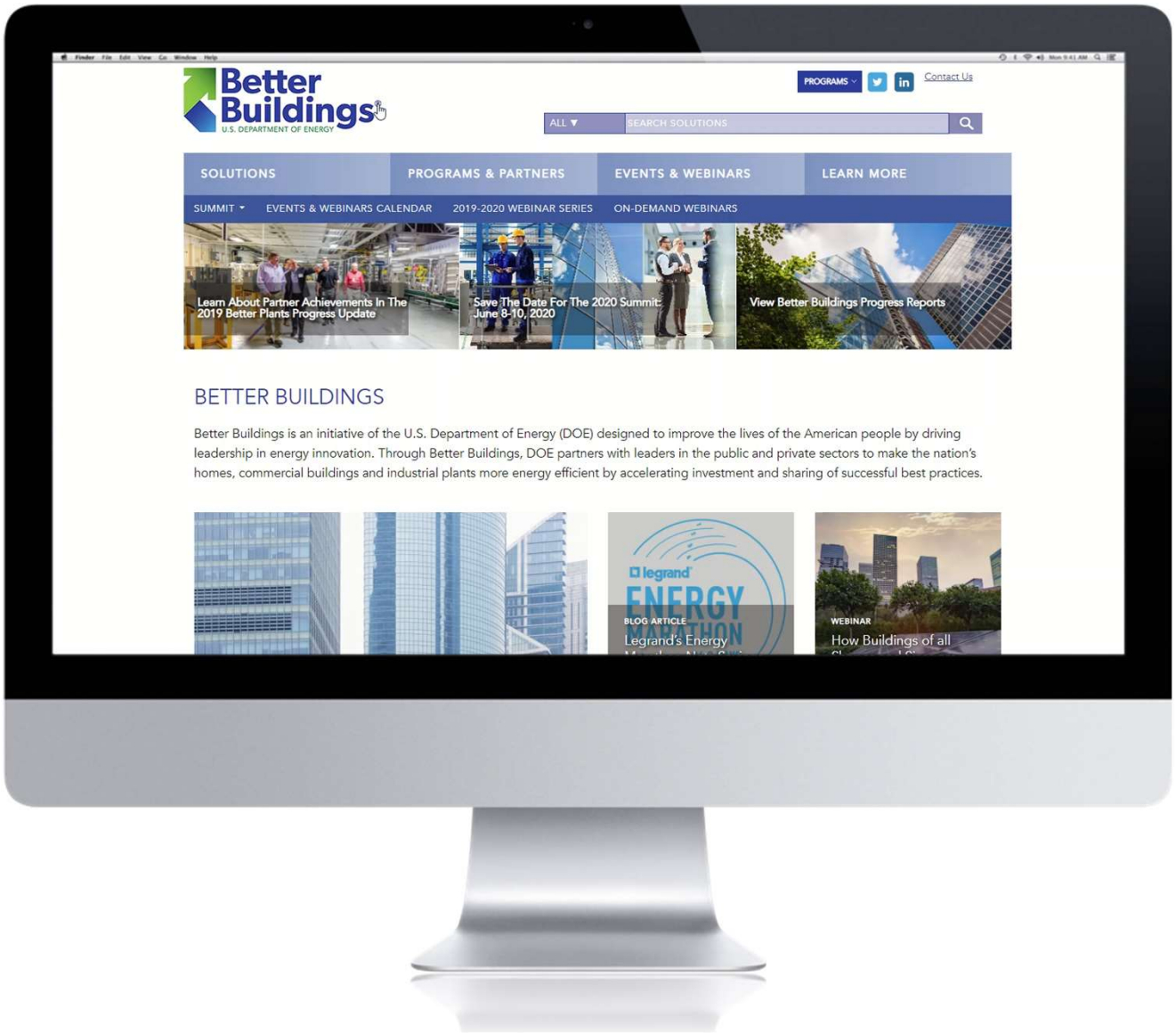

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PUMPS AND FANS

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